

REMARKS

Applicants respectfully request that the above application be reconsidered. Claims 17-31 are currently pending.

A. Response to Alleged Defective Oath/Declaration

At page 2 of the Office Action (see paragraph 1), it is alleged that the oath or declaration for the above application is defective because it does not properly identify the U.S. parent application to which the above application claims benefit.

Applicants respectfully traverse this objection. The copy of the prior oath/declaration from the parent application that was submitted with the filing of this divisional application is in complete compliance with 37 CFR 1.63(d)(1). Contrary to what is alleged in the Office Action, all that 37 CFR 1.63(d)(1) requires is that the copy of the prior executed oath/declaration show that it was signed, which it did. Indeed, when a copy of the oath/declaration from the parent application is provided in filing the divisional application, that oath/declaration would obviously not refer to the parent application, which is clearly contemplated by 37 CFR. 1.63(d)(1). Accordingly, Applicants respectfully request that this objection to the oath/declaration be withdrawn.

B. Response to Objection to Drawings

At pages 2-3 of the Office Action (see paragraph 2), the drawings have been objected to as not having proper identification numbers, i.e., Figure 1.

Applicants respectfully traverse this objection. The copy of the drawing from the parent application that was submitted with the filing of this divisional application is in complete compliance with 37 CFR. 1.84. Contrary to what is alleged in the Office Action, there is no need to identify the one Figure in the drawing copy that was submitted with the filing of this divisional application. Indeed, what the Office Action suggests is clearly contrary to what is stated in 37 CFR 1.84(u)(1) with regard to numbering of the views:

“Where only a single view is used in an application to illustrate the claimed invention, it must not be numbered and the abbreviation “FIG.” must not appear.”
(Emphasis added).

Accordingly, Applicants respectfully request that this objection to the drawing be withdrawn.

C. Response to Rejection of Claims 17-25 and 27-31 under 35 U.S.C. § 103(a) as Unpatentable over Spence et al, in View of Hasz et al

At pages 3-7 of the Office Action (see paragraph 5), the Examiner has rejected Claims 17-25 and 27-31 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 5,324,544 (Spence et al), in view of U.S. Patent 5,871,820 (Hasz et al). Briefly, Spence et al discloses a method for protecting fuel contacting surfaces of a gas turbine engine from carbon deposits by applying a coating of alumina and silica thereto from a sol-gel. See abstract. Briefly, Hasz et al discloses protecting thermal barrier coatings by using an impermeable barrier coating that is a dense non-cracked, non-porous layer. See abstract and col. 2, lines 17-31.

Applicants respectfully traverse this rejection. Contrary to what the Office Action suggests, Spence et al does not teach or suggest the method of Claims 17-25 and 27-31. In particular, Spence et al does not teach or suggest infiltrating the porous outer layer of the thermal barrier coating with an alumina precursor according to the claimed method. See step 2 of Claim 17. Instead, Spence et al teaches coating the fuel contacting surface/component with a thin, high temperature resistant layer of alumina and silica deposited from a sol-gel. See col. 3, lines 17-22. Nowhere does Spence et al teach or suggest that the deposited sol-gel infiltrates the fuel contacting surface/component, much less a porous outer layer of a thermal barrier coating as in the claimed method.

Indeed, as acknowledged by the Office Action, Spence et al does not teach protecting a thermal barrier coating comprising a non-alumina ceramic layer. Instead, the Office Action relies on Hasz et al to teach protecting a thermal barrier coating from environmental contaminants, and providing a metal substrate with a thermal barrier coating comprising a ceramic layer, such as yttria stabilized zirconia, on a bond coat (referring to the abstract and col. 1, lines 19-56). The

Office Action also refers to Hasz et al as teaching depositing the impermeable barrier layer by using sol-gel techniques.

The Office Action's reliance on Hasz et al is misplaced. For the teachings of Hasz et al to be properly combinable with those of Spence et al, there must be some alleged motivation for one skilled in the art to do so. Such properly alleged motivation is lacking in the Office Action. Instead, the Office Action simply makes a conclusory allegation that it would be obvious to modify Spence et al to use a protective coating on a thermal barrier coating as suggested by Hasz et al "because [Spence et al] teaches applying an alumina/silicon coating protects various substrates, including ceramic, from contaminants and [Hasz et al] teaches thermal barrier coatings, with outer layers of ceramic, benefit from a contaminant protective coating." However, the contaminants addressed in Spence et al (i.e., carbon deposition) are not the same or similar as the contaminants addressed in Hasz et al (i.e., calcium-magnesium-aluminum-silicon oxides such as CMAS). Accordingly, the Office Action fails to provide any properly alleged motivation for why one skilled in the art would consider the teachings of Hasz et al relevant to those of Spence et al, and vice versa.

Even if properly combinable with Spence et al, Hasz et al still fails to teach or suggest infiltrating the porous outer layer of a thermal barrier coating with an alumina precursor according to the method of Claims 17-25 and 27-31. Instead, Hasz et al, similar to Spence et al, forms an impermeable barrier coating on the thermal barrier coating, whether it be deposited from a sol-gel or otherwise. Nowhere does Hasz et al teach or suggest that the deposited sol-gel infiltrates the thermal barrier coating as in the claimed method.

For at least the foregoing reasons, the method of Claims 17-25 and 27-31 is unobvious over Spence et al, even in view of Hasz et al.

D. Response to Rejection of Claim 26 under 35 U.S.C. § 103(a) as Unpatentable over Spence et al, in View of Hasz et al, and Further in View of Ceramic and Glasses

At page 7 of the Office Action (see paragraph 6), the Examiner has rejected Claim 26 under 35 U.S.C. § 103(a) as unpatentable over Spence et al, in view of Hasz et al, and further in view of pages 11, and 752-53 from Volume 4 of the Engineered Materials Handbook (Ceramics

and Glasses). Briefly, page 752 of Ceramics and Glasses discloses that: (1) a number of transitional alumina structures can form initially with increasing temperatures, but all structures are transformed irreversibly to alpha alumina with a corundum structure of a hexagonal system; and (2) alpha alumina is the only stable form above 1200°C (2190°F).

Applicants respectfully traverse this rejection for at least the same reasons why Claims 17-25 and 27-31 are unobvious over Spence et al, in view of Hasz et al. In addition, Ceramics and Glasses does not teach or suggest that the alpha alumina formed would be finely divided, as defined in Claim 26. Indeed, because Spence et al and Hasz et al fail to teach or suggest infiltration of the alumina within a porous outer layer of a thermal barrier coating, the combination of Ceramics and Glasses with these other two references still fails to teach or suggest the method defined in Claim 26.

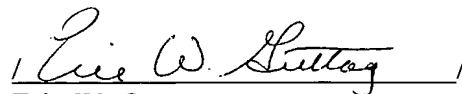
For at least the foregoing reasons, the method of Claim 26 is unobvious over Spence et al, in view of Hasz et al, and even further in view of Ceramics and Glasses.

E. Conclusion

In conclusion, the copy of the oath/declaration from the parent application that was filed with this divisional application is in complete compliance with 37 CFR 1.63(d)(1). The copy of the drawing from the parent application that was filed with this divisional application is also in complete compliance with 37 CFR. 1.84. Claims 17-31 are also unobvious over the prior art relied in the Office Action. Accordingly, Applicants respectfully request that Claims 17-31 be allowed to issue in the above application.

Respectfully submitted,

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